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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,225	12/07/2005	Abdelhamid Sayari	OSLER1120	2908

28213 7590 05/12/2009

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EXAMINER
CORNO JR, JAMES A

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
05/12/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,225	SAYARI, ABDELHAMID	
	Examiner	Art Unit	
	JAMES CORNO	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 13-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 13-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see pages 9-10, filed February 11, 2009, with respect to the rejection(s) of claim(s) 1-5, 7, and 13-19 under 35 USC 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Birbara, Stein, and Sayari.

The objection to claim 21 and the rejection of claims 1, 9, and 17 under 35 USC 112 have been overcome by the amendments and are withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Sayari et al. (*Chemistry of Materials* **13**, p. 3151-3168 September 2001). Sayari teaches amine-functionalized mesoporous silica by use of an amine-containing swelling agent (section 3.2). Sayari does not teach that the structures possess the claimed CO_2 adsorption capacity. However, the process taught by Sayari is consistent with example RF-4E presented by applicant. The capacity is therefore assumed to be inherent.

Regarding claim 17, Sayari teaches the use of amine-containing amphiphiles (DHMA and CTMAB; sections 3.1 and 3.2).

Regarding claim 18, Sayari teaches the use of an amine-containing swelling agent (DMDA; section 3.2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-6, 8-11, 13-17, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birbara et al. (US Patent No. 5,876,488) in view of Stein et al. (*Advanced Materials* **12**(19) p. 1403-1419, 2000). Birbara teaches a mesoporous material with an amine-functionalized surface for use as a reusable carbon dioxide adsorbent.

Birbara does not teach the use of mesoporous silica. Stein teaches that the surface of mesoporous silicas may be functionalized with amines through a known grafting process (section 2.1.2) and that functionalized mesoporous silica is useful as an adsorbent (section 4.2.4). It would have been obvious to one of ordinary skill in the art at the time of the invention to use any porous support fitting the requirements of Birbara (a porous material with high surface area that is readily functionalizable with useful

amines; see col. 3, lines 25-47), including mesoporous silica, with a reasonable expectation of success.

Alternatively, Stein indicates that mesoporous silica is particularly useful for its readily tunable pore diameters (Introduction) and that pore diameter has been recognized as a factor in adsorption performance (section 4.2.4). It would have been obvious to one of ordinary skill in the art at the time of the invention to use mesoporous silica in Birbara's adsorption device in order to allow fine-tuning of the pore diameter for maximum performance.

Neither Birbara nor Stein teaches the claimed CO_2 adsorption capacity. However, because the references teach the same structure (amine-functionalized, mesoporous silica) made by the same process (grafting or co-condensation), the CO_2 adsorption capacity is assumed to be the same.

Regarding claim 2, Stein teaches that amines may be covalently bound to the surface of the silica (section 2.1.2).

Regarding claim 3, Stein teaches that trialkoxysilanes may be used for grafting (section 2.1.3).

Regarding claim 4, Stein teaches that areas not covered by grafting may be hydrophobic or may be made hydrophobic (section 2.1.3).

Regarding claims 5 and 6, Birbara teaches that diethanolamine is the preferred adsorbent group.

Regarding claim 8, Birbara teaches carbon dioxide adsorption.

Regarding claim 9, Birbara teaches a method of dry-scrubbing in which the amine-functionalized support is exposed to a gaseous stream containing an acid gas.

Regarding claim 10, Stein teaches that amines may be covalently bound to the surface of the silica (section 2.1.2).

Regarding claim 11, Stein teaches that areas not covered by grafting may be hydrophobic or may be made hydrophobic (section 2.1.3).

Regarding claim 13, Stein teaches that grafting may be accomplished by exposing the silica to silanes containing the desired functional groups.

Regarding claim 14, Stein teaches that the functionalized silica may be formed by co-condensation (section 2.3).

Regarding claims 15 and 16, Stein teaches that grafting may be accomplished by reacting surface groups with amines (section 2.1.2).

Regarding claim 17, Stein teaches the use of a swelling agent. It would have been obvious to one of ordinary skill in the art at the time of the invention to remove the swelling agent to expose the silanol groups for any grafting process that relies on those silanol groups.

Regarding claim 20, Stein teaches that the surface may be functionalized by first adding alkyl halides to the surface and then displacing the halogen with the desired functional group.

Regarding claim 21, Birbara teaches that amine-terminated porous structures may be used in a dual bed system including pumps and valves (Fig. 1).

Regarding claim 22, Birbara teaches CO_2 removal.

Regarding claims 23-24, Birbara teaches that the sorbent may be in pellet form (col. 3, line 55). It would have been obvious to one of ordinary skill in the art at the time of the invention to use any appropriate binder, whether reactive or inert, with a reasonable expectation of success.

Claims 7, 20, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Birbara in view of Stein as applied to claims 1 and 9 above, and further in view of Sayari. Birbara in view of Stein does not teach functionalization of an organosilica framework. Sayari teaches that organosilica provides superior structure control to that of the other mesoporous silicas. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use Sayari's mesoporous organosilica as the support for Birbara's adsorbent in order to maximize structure control.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES CORNO whose telephone number is (571)270-5829. The examiner can normally be reached on Monday-Thursday 9:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES CORNO/
Examiner, Art Unit 1793

JC
May 8, 2009

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793